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ABSTRACT

This paper outlines and analyzes the important methodological and experimental design considerations uncovered by recent inquiries into the effects of alcohol on human behavior. The major issues discussed include: (1) the need and technique for complete manipulation of subjects' beverage expectancies in conjunction with alcohol and placebo administrations; (2) subject selection, with particular emphasis on the importance of subjects' prior experience with alcohol and how this might be assessed; (3) dosage, type, and measurement factors in alcohol administration; and (4) subjects' predispositions, the nature of their experimental tasks and the importance of the setting and social context of the experiment. (Author)

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Methodological Issues in the Study of the Effects of Alcohol on Human Behavior

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Abstract

This paper outlines and analyzes the important methodological and experimental design considerations which recent inquiries into the effects of alcohol on human behavior have uncovered. The major issues discussed include: (1) the need and technique for complete manipulation of subjects' beverage expectancies in conjunction with alcohol and placebo administrations, (2) subject selection, with particular emphasis on the importance of subjects' prior experience with alcohol and how this might be assessed, (3) dosage, type,and measurement factors in alcohol administration, and (4) subjects' predispositions, the nature of their experimental tasks and the importance of the setting and social context of the experiment.

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This paper examines some important research considerations in the study of effects that alcohol consumption and intoxication may have on human behavior. The approach outlined focuses on social psychological and learning factors, as opposed to strictly physiological or pharmacological variables, in the response of humans to alcohol. Such an emphasis is certainly not novel, but the relevant issues are so often neglected that this paper might be entitled, "Everything that has been thought of before, with the accompanying problem of thinking of it again." As early as 1943 Horton completed a cross-cultural study of the functions of alcohol in primitive societies and concluded that, though he believed alcohol serves to release sexual and aggressive impulses, it is clear that this effect is greatly diminished (as is drinking to intoxication) if the society is intolerant of deviant behavior by inebriated individuals. Similarly, Washburne (1956) has observed that "...people in different cultures, subcultures, groups, and situations behave differently despite similar concentrations of alcohol in the blood (at least up to around 0.25%)" (p. 109). Hence, he stressed consideration of the role of personality and social factors in alcohol/behavior research. He went on to make the very important point that the consequences of and reactions to psychosocial factors are just as "real" as the physical effects of alcohol, and that indeed these variables are capable of interacting with and influencing each other. Finally, Mello (1968) pointed to the importance of specifying the reinforcement history which contributes to the development as well as the maintenance of behaviors which might be affected by alcohol. She cautioned against a tendency to look for "alcohol-related changes" within a single (pharmacological)

framework which ignores possible alternate explanations. Of note, for example, is the fallacy inherent in the assumption that alcohol has a direct or mediating effect on anxiety, depression, aggression, etc., when in fact it may serve simply to weaken or modify stimulus control of the response in question rather than producing any specific effect on it. These possible changes in stimulus control may, of course, be due to alterations in sensory or attentional functioning caused by the alcohol. However, they may also be a consequence of the fact that alcohol consumption can serve as a discriminative stimulus (cf. Overton, 1968) which signals the operation of a different set of reinforcement contingencies and hence modifies cognitive expectations, affective experiences and actual behaviors. It is abundantly clear from the research of the past several decades that learning does occur if the conditions are right, and there is no reason to believe that this is less true of the effects of alcohol on human behavior than it is of any other phenomenon. Given the proper reinforcement history, situation, and contingencies one may come to think, feel, and act in either bizarre or in mundane ways when intoxicated, and over time it may take less alcohol to prompt these reactions as the response is practiced. Again, it should be emphasized that these almost automatic conditioned reactions to alcohol are every bit as real as the physiologically-based reactions which are so often the exclusive target of alcohol-behavior researchers. Furthermore, the learning of particular responses to alcohol need in no way be construed as an indication of a flaw in one's personality or of his conscious attempt to absolve himself of responsibility for "abnormal" behavior. On the contrary, it is maintained that learned responses to alcohol are simply facts of life for all of us--

and facts which one should be very cognizant of if he plans to study the effects of alcohol on human behavior.

Before continuing, it should be made clear that this paper focuses mainly on methodological issues relevant to the independent variables in alcohol/behavior research, and makes little or no attempt to address the complex problems involved in operationalizing and measuring such diffuse constructs as "anxiety" or "aggression." Nevertheless, one can only applaud and encourage the efforts of such researchers as Steffen, Nathan, and Taylor (1974), Polivy, Schueneman and Carlson (1976), and Wilson and his colleagues (Briddell & Wilson, 1976; Wilson & Lawson, 1976a,b) who have sought to include multimodal measurements in their studies in order to tap physiological, subjective, and overt behavioral responses to alcohol.

Expectancy

Until recently, attempts to control for subjects' relevant prior learning and experimental demand characteristics in alcohol/behavior research have been restricted to adding either a simple placebo group or a placebo and a no-beverage "control"group to active beverage conditions (cf. Bennett, Buss, & Carpenter, 1969; Shuntich & Taylor, 1972). Unfortunately, neither of these designs gives adequate consideration to expectancy or conditioning factors which have been developed through social learning experiences and which may, by the time of the experiment, exert significant if not overriding effects on behaviors observed when the alcohol variable is manipulated. In order to fully explore the role of psychological versus pharmacological factors in the test situation, it is necessary to include a condition in which subjects believe they are receiving a placebo when actually they are receiving alcohol. Further, an improvement over the "control" group mentioned above is one in which subjects actually drink a nonalcoholic beverage and are given accurate information about its contents. The first study to use a 2 x 2 design which fully manipulated both alcohol and expectancy as independent variables was one by Lang, Goeckner, Adesso and Marlatt (1975) who were exploring the effects of alcohol on aggression. These investigators used a paradigm originally developed by Marlatt, Demming, and Reid (1973) as a dependent measure of drinking behavior in alcoholics and nonalcoholics who thought they were performing a taste-rating task. The paradigm involves completely crossed expectancy and beverage manipulations using vodka and tonic or tonic alone as the drinks, since given the proper 1:5 ratio of vodka to tonic, the alcoholic and placebo beverages cannot be distinguished from each other

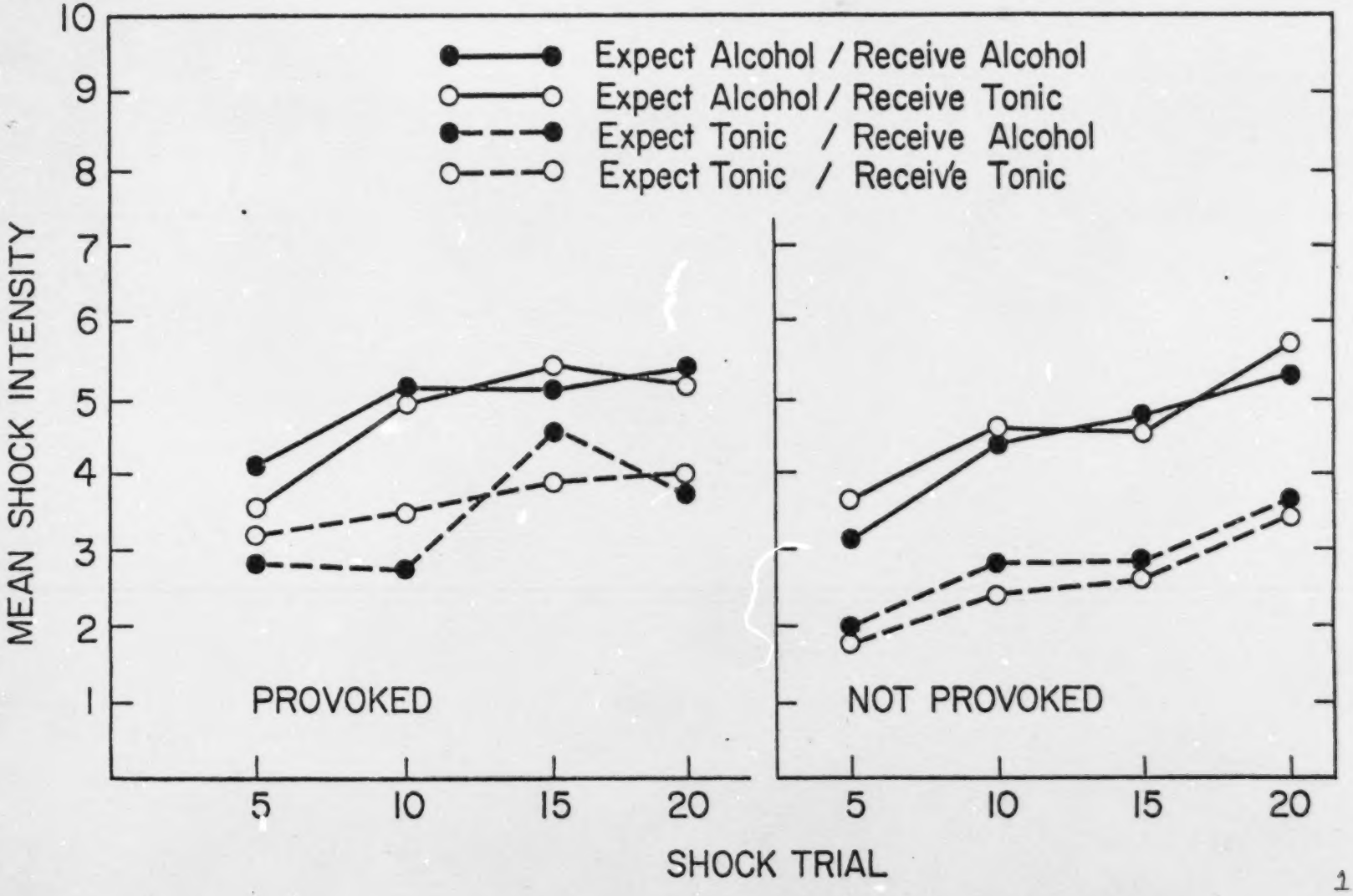
on the basis of taste. What Lang et al. found was that those subjects who thought they had received alcohol were significantly more aggressive than those who thought they had received tonic alone--regardless of the actual content of the drink.

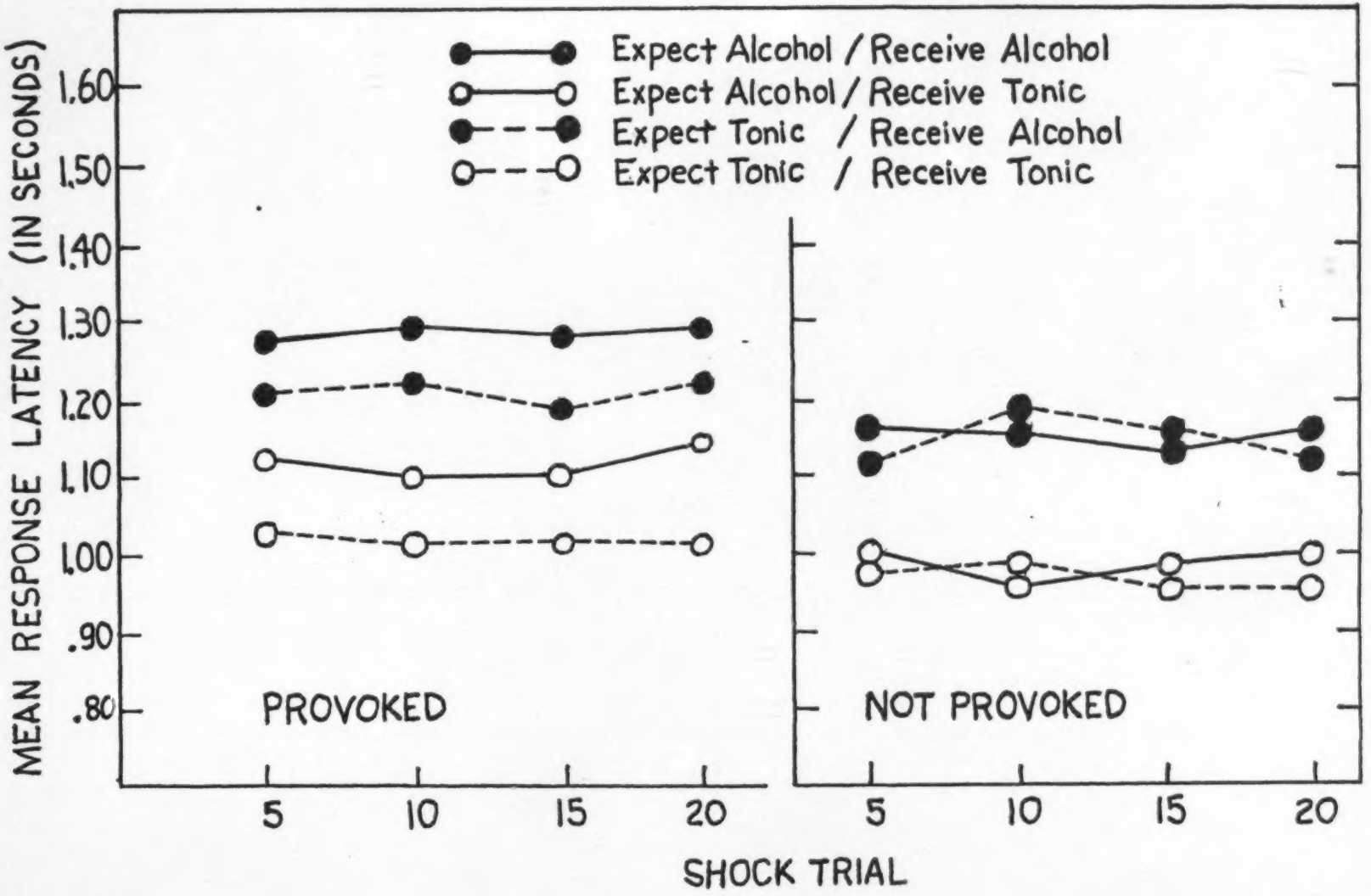
First Transparency

Thus, it appears that aggression, a behavior with great social relevance and also one which is influenced significantly by social learning (Bandura, 1973), is highly susceptible to expectancy, but may be relatively unaffected by the pharmacological action of the 0.10% blood alcohol concentration used in this experiment. Reaction time, on the other hand, a psycho-motor function of little social relevance and subject to relatively minor variations as a consequence of incidental learning, was profoundly affected by the actual alcohol content of the drinks in this experiment, but was not influenced at all by beverage expectancies.

Second Transparency

Since this initial alcohol-aggression study in 1975, several investigators have published complete or partial replications of the remarkable expectancy effect in such diverse areas as sexual response (Wilson & Lawson, 1976a, b), tension reduction (Polivy, Schueneman & Carlson, 1976), and eating behavior (Polivy & Herman, 1976), though these researchers may be subject to some criticism for the relatively low doses of alcohol they employed. In any event, it would appear to behoove the careful student of alcohol-behavior relations to pay close attention to expectancy factors


Expect Alcohol / Receive Alcohol
Expect Alcohol / Receive Tonic
Expect Tonic / Receive Alcohol
Expect Tonic / Receive Tonic
MEAN SHOCK INTENSITY
10
9
8
7
6
5
4
3
2
1
PROVOKED
NOT PROVOKED
5
10
15
20
SHOCK TRIAL


Expect Alcohol / Receive Alcohol
Expect Alcohol / Receive Tonic
Expect Tonic / Receive Alcohol
Expect Tonic / Receive Tonic
MEAN RESPONSE LATENCY (IN SECONDS)
1.60
1.50
1.40
1.30
1.20
1.10
1.00
.90
.80
PROVOKED
NOT PROVOKED
5
10
15
20
SHOCK TRIAL

in the research designs he develops. Furthermore, there is some suggestive evidence from the Lang, et al. (1975) study that the importance of expectancy considerations may be positively correlated with the social relevance and perhaps the affect associated with the behavior in question. While this hypothesis awaits verification through further investigation, it is consistent with the findings of Higgins and Marlatt (1973; 1975) that anxiety or fear led to increased drinking when the stimulus was interpersonal evaluation, but not when it was threat of electric shock.

Subject Selection

Another problem one must address in any research is that of subject selection. Following the behaviorally-oriented reasoning outlined earlier, it should not be difficult to see that a crucial consideration in alcohol/behavior research is the experience a subject has had with alcohol. From a learning theory perspective, the habitual heavy drinker has simply had more opportunities to acquire and practice responses to alcohol which go beyond basic physiology, so it would not be surprising to find he reacts differently to it than do light or moderate social drinkers. Several authors have suggested that because of learning factors, experienced users of both alcohol (Cameron, 1974) and marihuana (Becker, 1953) are likely to be more susceptible to placebo effects. Mello (1968) has reviewed a number of studies which consistently demonstrate alcoholics' pharmacological tolerance as well as behavioral tolerance for alcohol, the latter being tested on tasks of dexterity, vigilance, attention, and reaction time. A series of experiments by Mayfield and Allen (1967, 1968a,b) has provided suggestive evidence of a gradient of alcohol's efficacy in producing positive mood change which is inversely related to experience with alcohol. Finally, Smith, Parker and Noble (1975) found, in their study of alcohol and affect in dyadic social interactions, that alcohol produced a significant increase in anxiety for "rare" drinkers which did not occur for moderate drinkers.

Thus, there is empirical evidence as well as a theoretical basis for carefully attending to drinking experience in selecting subjects for alcohol/behavior research. The question then becomes: How is this selection to be accomplished? If it is done at all, pre-experimental screening

of subjects' drinking experience is typically dependent on their self-reports. Though Summers (1970) and Harford, Dorman, and Feinhandler (1976) have called attention to the questionable validity and reliability of self-reported drinking history and behavior in both alcoholic and social drinkers, there would still appear to be some utility to questionnaires, at least as far as gross selection and group assignment criteria are concerned. Measures such as the Jessor (1968) method currently used by NIAAA-affiliated alcohol treatment programs and the Drinking Practices Questionnaire (Cahalan, Cisin, & Crossley, 1969) show some promise, but could be improved with minor modifications. One particular suggestion is the incorporation of a body weight factor into quantitive drinking scores. This would enable one to distinguish a 100kg, six drink per day man from his 50kg girl friend who drinks a like amount, but probably experiences significantly different consequences. Such a consideration is an especially important one in well designed alcohol/behavior studies which usually administer doses calculated to achieve a certain blood alcohol concentration (BAC) rather than giving equal doses to all subjects. Thus, if one is trying to match subjects on their experience with a given BAC, using body weight in combination with the quantity, frequency, and variability of drinking should improve the precision of advance estimates and hence permit selection of more homogeneous subject populations. An additional technique for improving the accuracy and utility of self-reported drinking behavior would be the use of collaterals, perhaps contacted by telephone. Of course, such a method may often prove too costly and time consuming to be practical, but the effect of leading subjects to believe that their reports will be checked with collaterals is one worth exploring. Finally, it may be useful in pre-selecting subjects to inquire about how they believe alcohol affects

them and others with regard to the behavior in question (cf. Wilson & Abrams, 1977). This would permit equal distribution of expectations across conditions and may hence reduce the likelihood of spurious results. In a similar fashion the measurement of prior emotional states or predispositions might improve predictive accuracy and enhance understanding of the psychological process operating.

Alcohol Dosage, Type, and Measurement Factors

Once an appropriate sample of subjects has been selected, the next problem is to select the dosage(s) of alcohol and administer it (them). Technically, the best procedure is to ask subjects to fast for a period of time (about four hours) prior to the experiment and then calculate doses on the basis of body weight to achieve the desired blood alcohol concentration (BAC). It is, however, important to check BACs directly during the experiment, or at least during piloting to assure that desired levels are being reached since certain mixers and other factors can influence absorption. Technical considerations aside, the BACs selected for study are critical since the effects of alcohol on both the physiology of the nervous system and the cognitive, affective, and behavioral responses of most interest appear to be nonlinear. For example, Mello's 1968 review of electrophysiological studies of alcohol and the CNS led her to conclude that it has a "biphasic" effect,acting as a stimulant at low doses with its depressive functions evident only at higher concentrations. Obviously, such a pattern of physiological action can affect other responses and indeed Russell and Mehrabian (1975) found in their review of alcohol and emotions that moderate doses tend to elevate feelings of pleasure, dominance, and arousal whereas large doses produce submissiveness, depression, and displeasure. Other investigators (McClelland, Davis, Kalin, & Wanner, 1972) have reported that aggressive fantasies are maximized in subjects at BACs of about 0.08%. Cameron (1974) has also shown that in social drinkers alcohol has an initial autonomic arousal and excitation/intoxication effect which is followed by CNS depression if doses are continued. In addition, this study calls attention to the fact that similar BACs can

produce quite different subjective reactions depending upon whether they precede or follow the acute intoxication phase. Tamerin and Mendelson (1969) have observed similar variations in the study of long-term intoxication in inpatient alcoholic men. What all of these findings suggest is that ideal tests of alcohol's effect on a given behavior should include several BACs, ranging from about 0.05% to 0.15% or more, unless a good rationale for selecting fewer levels is provided. Further, the direct measurement of BACs at two or more critical times in the experiment is recommended. This is especially important in view of research (e.g., Jones & Vega, 1972) demonstrating measurable differences in cognitive functioning at precisely equal BACs depending upon whether a subject is on the ascending or descending limb of his BAC curve. Obviously, similar differences in affectives or other behavioral variables might result from measurement before or after peak BACs.

One final related consideration is that of the type of alcoholic beverage selected for administration.While there is some obvious potential for different behavioral consequences of consumption of beer, wine, or hard liquor, one might also need to attend carefully to the particular beverages he selects in the hard liquor category alone. This is because these beverages differ in their "congener content," i.e., in the composition of their content exclusive of absolute alcohol. A recent experiment by Taylor and Gammon (1975) has suggested that equal alcohol doses of vodka vs. bourbon (low vs. high congener content, respectively), may account for differences observed in the aggressive behavior of the subjects involved. While alternative explanations exist for these findings, the point that beverages with similar alcohol content cannot be regarded as identical should

not be ignored. Thus, one must be careful in making generalizations about the effects of "alcohol" on any given behavior without specifying the type, dosage, and method of beverage administration.

Situation and Social Context

Just as the effects of alcohol on behavior may be influenced significantly by reinforcement history and expectations born of experience, so may the immediate circumstances a subject finds himself in profoundly affect his responses to alcohol. One should not be surprised to find that the party atmosphere of the studies by Williams (1966) or McClelland et al. (1972) might facilitate responses quite different from those observed on inpatient hospital wards (e.g., Mendelson, LaDou, & Solomon, 1964). Similarly, it is important to consider whether the subjects are being paid (Shuntich & Taylor, 1972), are volunteers (Lang et al., 1975), or are more or less being coerced to participate in the research (Nathan & O'Brien, 1971). Such variables not only are likely to influence affective predispositions, but may also affect the extent to which experimental artifacts such as reactance, evaluation apprehension and demand characteristics are ooerating.

The social context provided by an experiment can also systematically bias results in alcohol/behavior experiments. A study by Smith, Parker, and Noble (1975), for example, examined the affective and emotional content of social interactions, but utilized only well-acquainted male/female couples whose responses to each other while drinking were undoubtedly somewhat different from those which might be observed in pairs who were strangers or who were of the same sex. Pliner and Cappell (1974) reported markedly different affective consequences of alcohol and placebo when their subjects drank and worked on tasks alone as opposed to when they did the same in groups of three. Of particular interest was the observation that solitary drinkers reported more intense feelings which were directly related to

physiology and internal body states (e.g., dizziness) while the social drinkers were inclined to focus on more socially relevant feelings (e.g., friendliness). Similarly, Bruun's 1959 study of the significance of role and norms in the small group for individual behavior changes while drinking showed that negative reactions and rate differentiation (central vs. isolated) in the intoxicated can be heavily influenced by the interpersonal context of the observation. This again highlights the importance of social environmental factors in the experience of intoxication and the effects that it may have on behaviors, particularly social behaviors. Unfortunately, research on alcohol/behavior relations to date has not systematically varied situations or social contexts thought the few studies reviewed above clearly point to the importance of such factors. Hopefully, future researchers will at least, as in the exemplary case of Smith et al. (1975) demonstrate an explicit awareness of these variables even if they choose not to manipulate them.

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